AMENDMENTS TO THE CLAIMS

Please amend Claim 1 and add new Claims 11-19 as follows.

LISTING OF CLAIMS

1. (currently amended) A refrigeration cycle system comprising:

a compressor for compressing and discharging a refrigerant;

a condenser for condensing the refrigerant discharged from the refrigerant compressor to a liquid refrigerant;

a liquid refrigerant receiver for separating the refrigerant delivered from the refrigerant condenser into a liquid refrigerant and a gaseous refrigerant and allowing only the liquid refrigerant to be delivered;

a variable throttle valve defining a valve hole through which the liquid refrigerant delivered from the liquid refrigerant receiver passes;

a valve body for adjusting an area of opening of the valve hole;

a refrigerant evaporator for evaporating the refrigerant having been adiabatically expanded upon passing through the valve hole of the variable throttle valve; and

a refrigerant-to-refrigerant heat exchanger for exchanging heat between a high pressure refrigerant delivered from said liquid refrigerant receiver and a low pressure refrigerant delivered from said refrigerant evaporator, ~~said refrigeration cycle system~~ wherein

said variable throttle valve is actuated in response to a level of subcooling of a refrigerant detected at an outlet of said high pressure refrigerant of said refrigerant-to-refrigerant heat exchanger in a manner that said variable throttle valve reduces an

area of opening or a degree of throttle opening of said valve hole or an amount of lift of said valve body as a level of subcooling of a refrigerant delivered from said refrigerant-to-refrigerant heat exchanger increases or has increased to a predetermined value or more, and

said variable throttle valve increases the area of opening or the degree of throttle opening of said valve hole or the amount of lift of said valve body as the level of subcooling of the refrigerant delivered from said refrigerant-to-refrigerant heat exchanger decreases or has reduced to the predetermined value or less.

2. (original) The refrigeration cycle system according to claim 1, wherein

said variable throttle valve is disposed downstream of said refrigerant-to-refrigerant heat exchanger and upstream of said refrigerant evaporator.

3. (original) The refrigeration cycle system according to claim 1, said refrigerant-to-refrigerant heat exchanger further comprising:

a first refrigerant conduit through which a high pressure refrigerant delivered from said liquid refrigerant receiver and directed to said variable throttle valve flows and a second refrigerant conduit through which a low pressure refrigerant delivered from said refrigerant evaporator and directed to said refrigerant compressor flows.

4. (original) The refrigeration cycle system according to claim 3, wherein

said refrigerant-to-refrigerant heat exchanger is a double-pipe refrigerant-to-refrigerant heat exchanger with an outer circumferential surface of one of said first and second refrigerant conduits being surrounded with the other refrigerant conduit.

5. (original) The refrigeration cycle system according to claim 3, wherein

said refrigerant-to-refrigerant heat exchanger is a double-layer refrigerant-to-refrigerant heat exchanger with one end face of one of said first and second refrigerant conduits being in close contact with one end face of the other refrigerant conduit.

6. (original) The refrigeration cycle system according to claim 3, further comprising:

a pipe joint or a block for connecting between the first refrigerant conduit of said refrigerant-to-refrigerant heat exchanger and an inlet pipe of said refrigerant evaporator, wherein

a high pressure refrigerant passageway, through which a high pressure refrigerant flows, is defined within said pipe joint or said block, and

said variable throttle valve is incorporated in said high-pressure refrigerant passageway.

7. (original) The refrigeration cycle system according to claim 3, wherein

a high pressure refrigerant passageway through which a high pressure refrigerant flows is defined within said first refrigerant conduit of said refrigerant-to-refrigerant heat exchanger, and

said variable throttle valve is incorporated in said high-pressure refrigerant passageway.

8. (original) The refrigeration cycle system according to claim 3, said variable throttle valve further comprising:

means for driving said valve body having a first pressure chamber in which a medium for converting a change in temperature of a refrigerant delivered from the first refrigerant conduit of said refrigerant-to-refrigerant heat exchanger to a pressure change is encapsulated, a second pressure chamber to which the refrigerant delivered from the first refrigerant conduit of said refrigerant-to-refrigerant heat exchanger exerts a high pressure, and a diaphragm to be displaced in response to a pressure difference between an internal pressure of said first pressure chamber and an internal pressure of said second pressure chamber, and

means for biasing said valve body to a close position, said valve body drive means having a biasing force of said valve body bias means to drivingly close said valve body when a level of subcooling of a refrigerant introduced into the valve hole of said variable throttle valve increases and the internal pressure of said first pressure chamber is lower than the internal pressure of said second pressure chamber, and

said valve body drive means drivingly opens said valve body against the biasing force of said valve body bias means when the level of subcooling of a refrigerant

introduced into the valve hole of said variable throttle valve decreases and the internal pressure of said first pressure chamber is higher than the internal pressure of said second pressure chamber.

9. (original) The refrigeration cycle system according to claim 3, further comprising:

an air conditioning unit for air-conditioning a passenger compartment of a vehicle, wherein

said refrigerant evaporator for exchanging heat between a refrigerant drawn from said variable throttle valve and air, and a hot-water heater for exchanging heat between cooling water for cooling an engine and air are disposed within an air conditioning casing of said air conditioning unit.

10. (original) The refrigeration cycle system according to claim 9, further comprising:

a first refrigeration cycle allowing a refrigerant discharged from said refrigerant compressor to pass through said condenser and said liquid refrigerant receiver and thereafter return through the first refrigerant conduit of said refrigerant-to-refrigerant heat exchanger, said variable throttle valve, said refrigerant evaporator, and said second refrigerant conduit of said refrigerant-to-refrigerant heat exchanger to said refrigerant compressor,

a second refrigeration cycle allowing a refrigerant discharged from said refrigerant compressor to bypass said refrigerant condenser and said liquid refrigerant

receiver and thereafter return through the first refrigerant conduit of said refrigerant-to-refrigerant heat exchanger, said variable throttle valve, said refrigerant evaporator, and said second refrigerant conduit of said refrigerant-to-refrigerant heat exchanger to said refrigerant compressor, and

cycle switching means for switching between said first refrigeration cycle and said second refrigeration cycle.

11. (new) The refrigeration cycle system according to claim 1, further comprising:

a subcooling detecting member disposed in a refrigerant passage between said outlet of said high pressure refrigerant of said refrigerant-to-refrigerant heat exchanger and said valve hole, the subcooling detecting member being formed to generate a mechanical displacement in response to a detected subcooling and to transmit the mechanical displacement to said valve body.

12. (new) The refrigeration cycle system according to claim 11, wherein said subcooling detecting member includes:

a diaphragm casing disposed in said refrigerant passage;

a diaphragm attached on the diaphragm casing, the diaphragm defining a pressure chamber with said diaphragm casing, and the diaphragm having a movable portion on which the mechanical displacement is obtained by a pressure of gas in said pressure chamber which is responsive to the subcooling; and

an actuating member disposed between said diaphragm and said valve body to actuate the valve body in response to the mechanical displacement.

13. (new) A refrigeration cycle system comprising:

a compressor for compressing and discharging a refrigerant;

a condenser for condensing the refrigerant discharged from the refrigerant compressor to a liquid refrigerant;

a liquid refrigerant receiver for separating the refrigerant delivered from the refrigerant condenser into a liquid refrigerant and a gaseous refrigerant and allowing only the liquid refrigerant to be delivered;

a variable throttle valve defining a valve hole through which the liquid refrigerant delivered from the liquid refrigerant receiver passes;

a valve body for adjusting an area of opening of the valve hole;

a refrigerant evaporator for evaporating the refrigerant having been adiabatically expanded upon passing through the valve hole of the variable throttle valve; and

a refrigerant-to-refrigerant heat exchanger for exchanging heat between a high pressure refrigerant delivered from said liquid refrigerant receiver and a low pressure refrigerant delivered from said refrigerant evaporator, wherein

said variable throttle valve reduces an area of opening or a degree of throttle opening of said valve hole or an amount of lift of said valve body as a level of subcooling of a refrigerant delivered from said refrigerant-to-refrigerant heat exchanger increases or has increased to a predetermined value or more, and

said variable throttle valve increases the area of opening or the degree of throttle opening of said valve hole or the amount of lift of said valve body as the level of subcooling of the refrigerant delivered from said refrigerant-to-refrigerant heat exchanger decreases or has reduced to the predetermined value or less, and wherein

said refrigerant-to-refrigerant heat exchanger comprises:

a first refrigerant conduit through which a high pressure refrigerant delivered from said liquid refrigerant receiver and directed to said variable throttle valve flows; and

a second refrigerant conduit through which a low pressure refrigerant delivered from said refrigerant evaporator and directed to said refrigerant compressor flows, and wherein

said variable throttle valve further comprises:

means for driving said valve body having a first pressure chamber in which a medium for converting a change in temperature of a refrigerant delivered from the first refrigerant conduit of said refrigerant-to-refrigerant heat exchanger to a pressure change is encapsulated, a second pressure chamber to which the refrigerant delivered from the first refrigerant conduit of said refrigerant-to-refrigerant heat exchanger exerts a high pressure, and a diaphragm to be displaced in response to a pressure difference between an internal pressure of said first pressure chamber and an internal pressure of said second pressure chamber; and

means for biasing said valve body to a close position, said valve body drive means having a biasing force of said valve body bias means to drivingly close said valve body when a level of subcooling of a refrigerant introduced into the valve hole of

said variable throttle valve increases and the internal pressure of said first pressure chamber is lower than the internal pressure of said second pressure chamber, wherein

said valve body drive means drivingly opens said valve body against the biasing force of said valve body bias means when the level of subcooling of a refrigerant introduced into the valve hole of said variable throttle valve decreases and the internal pressure of said first pressure chamber is higher than the internal pressure of said second pressure chamber.

14. (new) A refrigeration cycle component provided between an evaporator and a refrigerant-to-refrigerant heat exchanger for exchanging heat between a high pressure refrigerant supplied to the evaporator and a low pressure refrigerant returned from the evaporator, the component comprising:

a member defining a high pressure passageway through which the high pressure refrigerant flows and a low pressure passage way through which the low pressure refrigerant flows; and

a subcooling control valve including:

a valve body movably supported in the high pressure passageway in a manner that the valve body varies an opening area of the high pressure passageway in accordance with a displacement of the valve body; and

a subcooling detecting member disposed in the high pressure passageway upstream the valve body, the subcooling detecting member being formed to generate a mechanical displacement in response to a subcooling detected from the refrigerant in the high pressure refrigerant passageway and to transmit the mechanical

displacement to the valve body so that the valve body narrows the opening area of the high pressure passageway as the level of the subcooling increases.

15. (new) The refrigeration cycle component according to claim 14, wherein the member is a block joint for providing passageways between the refrigerant-to-refrigerant heat exchanger and the evaporator.

16. (new) The refrigeration cycle component according to claim 15, wherein the refrigerant-to-refrigerant heat exchanger has a double tube structure, and the member is the block joint disposed on an end of the refrigerant-to-refrigerant heat exchanger.

17. (new) The refrigeration cycle component according to claim 16, wherein refrigerant-to-refrigerant heat exchanger has an inner tube in which a conduit for the high pressure refrigerant is provided, and an outer tube defining a gap outside the inner tube, the gap providing a conduit for the low pressure refrigerant.

18. (new) The refrigeration cycle component according to claim 16, wherein the block joint is an elbow to form the passageways in an L-shape.

19. (new) The refrigeration cycle component according to claim 16, wherein the subcooling detecting member includes:

a diaphragm casing disposed in the high pressure refrigerant passageway;

a diaphragm attached on the diaphragm casing, the diaphragm defining a pressure chamber with said diaphragm casing, and the diaphragm having a movable portion on which the mechanical displacement is obtained by a pressure of gas in the pressure chamber which is responsive to the subcooling; and

an actuating member disposed between the diaphragm and the valve body to actuate the valve body in response to the mechanical displacement.